

Why paging?

Erie County has elected to partner with the State of New York in their Statewide Wireless Network (SWN) using state of the art digital trunking technology. In general, trunking systems no not currently support traditional tone and voice paging applications, thereby necessitating the design and implementation of a dedicated public safety grade alerting system for Erie County responders.

The county is currently served by multiple Public Safety Answering Points (PSAPs) which support 911 emergency calls according to each call's geographic location within the County. Many of these PSAPs currently operate their own independent tone and voice paging systems to alert fire and EMS agencies and personnel. As a result, no single county-wide paging capability currently exists and a large portion of the county's southern tier has limited paging coverage, making it extremely difficult to alert emergency services personnel across the county.

In order to alert its public safety agencies on an expedient and county-wide basis, the County is implementing a new state of the art digital paging network. To define the agencies' needs and the proposed paging system's performance objectives, representatives of various fire, EMS and law enforcement agencies were interviewed, the results were compiled and recommendations were developed. After a review of alternatives and a survey of Monroe County's (Rochester) paging operations, Erie County Commissioners decided to develop a one-way alphanumeric paging (text message paging) network.

Why not Tone and Voice paging?

Historically, fire and EMS agencies across the country have used tone and voice (analog) paging systems to alert stations and personnel in the event of an emergency. Those who recall the '70s TV series "Emergency" may recall hearing the alerting tones, before each deployment. Through years of experience, members of these agencies generally learn to recognize the sound of their own department's unique tone sets and have grown accustomed to being able to listen for the verbal instructions that follow, in essence using the pager as a typical radio receiver from that point forward.

Specifically, Tone and Voice systems utilize audible tones broadcast over conventional licensed radio channels to address individuals, groups and/or stations intended to be alerted and then utilize the same channel to broadcast subsequent verbal instructions. As each intended recipient requires two or more tones to be transmitted and as each tone requires air-time, a single typical page could easily require more than one second for addressing, plus several additional seconds for verbal instructions. Considering further that an alerting event might include several agencies, departments and individuals, combined with requirements to send redundant alerts, a single tone and voice paging channel could be tied up for a few minutes or more on a single event. Considering



emergency response time requirements, this would imply a need for several paging channels if the tone and voice format had been selected by Erie County.

Why Alphanumeric?

Alphanumeric (digital) paging has several advantages over Tone and Voice, but also a few perceived disadvantages.

Advantages:

Speed / Channel Capacity – Digital paging systems require only a few milliseconds (thousandths of a second) of air-time to alert a station, pager or group. Furthermore, considering a direct interface to the County's Computer Aided Dispatch (CAD) system, an entire multi-agency alerting event, could be completed before a comparable Tone and Voice system could finish transmitting the first set of tones. Depending on the final design's configuration, this means that a single alphanumeric channel will have sufficient capacity to facilitate the County's fire and EMS requirements in addition to the law enforcement agencies and still have spare capacity that could be used for administrative and other County uses.

Coverage / Penetration – Because digital messages require so little air-time and use modern forward error correction techniques, they are less affected by fading events, meaning that digital pages can be received in places where analog pages have difficulty (considering comparable signal strength).

Resistive to Eves Dropping / Scanners – Digital paging formats are standardized and therefore potentially subject to monitoring by unauthorized personnel, however most people have no ready means of scanning digital paging channels, thereby providing some degree of privacy over the channel. This is a definite advantage when considering HIPPA and law enforcement agencies' requirements.

Commercial Off the Shelf Availability – As a result of the relative popularity of commercial digital paging services, alphanumeric pagers are readily available from numerous manufacturers at prices of around \$100 each (roughly 20% of the cost of a tone & voice pager).

Message Content – Interfaced directly to CAD, a digital paging system can relieve some of the dispatcher's work load, by directly providing addressing and message content such as type and location of incidents.

Message Storage – Digital alphanumeric pagers offer inherent message storage, so street addresses and other critical information is retained for subsequent review.



Priority Paging – Although digital pages are sent much faster, they still take time and under heavy traffic loading can result in queuing. To account for heavy loading, priorities can be established to enable critical pages to move to the top of the queue.

Group Paging – Although each digital pager has a unique address, additional addresses are built in to facilitate group paging.

Perceived Disadvantages:

Alerting Volume – Alphanumeric pagers generally do not produce as much audio volume as currently available digital pagers. This can be a significant disadvantage for the hearing impaired and sound sleeping first responders. Much like first time parents can learn to tune in or out the crying newborn, most responders too can learn to be alerted by the digital pager's beeps and/or vibrations.

Reading vs. Listening – Alphanumeric messages cannot be heard over today's commercially available digital pagers, but may not hold true in the future, given currently available text to voice technology used in other industries. The requirement to read digital messages can be a significant disadvantage for the responder needing updates enroute.

Case Study:

By request, Monroe County, New York provided insight on their paging operations to help Erie County to resolve the many considerations. According to Monroe County's Jim Weichman, the County currently operates both traditional a Tone and Voice paging network and an alphanumeric paging network. He reported that initially, fire and EMS personnel wanted to use their tone and voice pagers, but that after a short while were found to prefer the digital pagers and today, very few prefer tone and voice pagers enough to carry them.

According to Weichman, the digital paging network was such a success that the County is currently upgrading to a new two-way paging network, whereby responders will be able to reply with their status or even initiate text messages directly from their pager.

Why Not Two-Way Alphanumeric?

Although a two-way alphanumeric system was considered for Erie County, it was not recommended by Kimball due to ineligibility of public safety agencies to obtain the necessary return channel license (Monroe County will require either a waiver from the FCC to obtain a return channel license or will have to negotiate the use of a commercial channel from a commercial licensee) and equipment availability issues (currently only one manufacturer).



System Requirements

The basic overall system requirements have been identified; however specific details are being refined.

Channel Performance Criterion

Delivery of 500 character alphanumeric messages with <2% Character Error Rate for pagers worn on the hip at 95% minimum reliability

Coverage

- Basic Coverage Area Requirement: No less than 95% of the area bounded by the
 official contour of Erie County, NY, including 12 dB minimum building
 penetration margin at 95% minimum reliability.
- Special Coverage Requirements (Special coverage requirements to be further refined):
 - Downtown Buffalo: No less than 95% of the area bounded on the north by Kenmore Avenue, on the east by Eggert Road, on the south by Ridge Road and on the west by Lake Erie, including 24 dB minimum building penetration margin
 - Metro Buffalo: No less than 95% of the area bounded on the north by Sheridan Drive, on the east by Transit Road, on the South by Southwestern Blvd. and on the west by Lake Erie, including 18 dB minimum building penetration margin
 - Lake Erie: No less than 95% of the lake area bounded by the official contour of Erie County, NY, including 12 dB minimum watercraft penetration margin
 - Fire and EMS Stations: No less than 99.9% reliability to each station defined to receive an alerting device
 - Specific Buildings: (Coverage requirements for specific buildings to be defined)

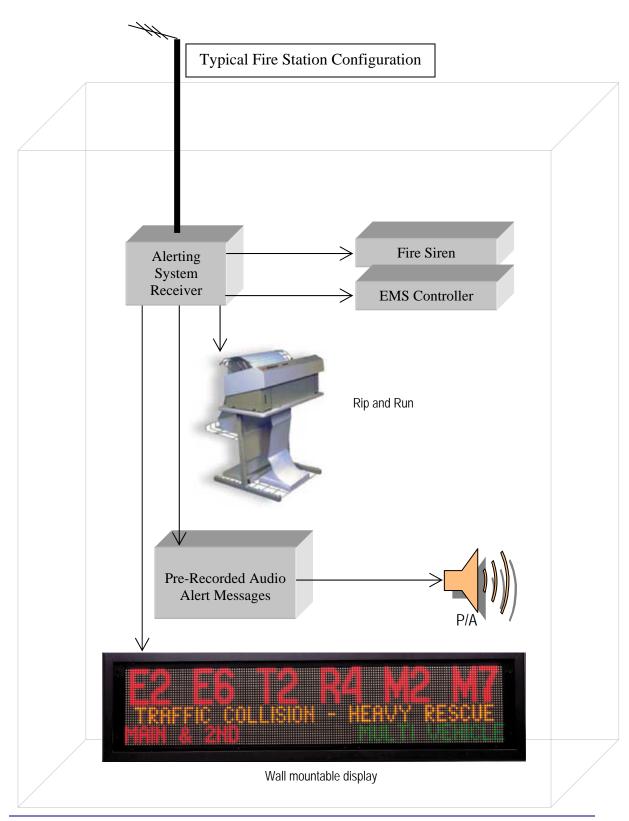
Page Input Interfaces

- Computer Aided Dispatch (CAD) New CAD and CHARMS at the Public Safety Campus (PSC) and possibly other CAD systems via standard TAP interface
- County LAN (computer network) Direct entry via standard web browser
- Desktop data entry devices (for back-up) to be located at fire stations, the Dispatch Center at the PSC and all other County PSAPS
- Stand alone PC software dial-up
- PSC facility's phone system and the Public Switched Telephone Network

Paging Receivers

- 10,500 pager units
- Station alerting devices with printers and wall mounted displays







Status and Schedule

A contract for pagers and station alerting systems has been signed and a second contract for the alerting network infrastructure is expected later this week.

Alerting transmitter site surveys are scheduled to begin on February 15, 2006. Surveys of several representative fire stations will begin on the following week to assess placement of the new equipment.

System construction must be substantially complete by the end of this year to satisfy funding requirements, and proof of performance testing is expected to begin around January 2007. Operational and maintenance training will then immediately precede system activation.

Specific schedule and design details are currently being refined.

 $C: \label{locuments} C: \label{locuments} C: \label{locuments} Documents and Settings \label{locuments} Settings \label{locuments} C: \label{locuments} Documents and Settings \label{locuments} Settings \label$